Maclurodendron: A New Genus of Rutaceae from Southeast Asia

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Abstract

The new rutaceous genus *Maclurodendron* consists of six species and ranges from Sumatra and the Malay Peninsula east to the Philippines and north to Vietnam and Hainan Island. The genus is described and its distinguishing features and apparent relationships are discussed. The six species are keyed, described, and their apparent relationships are outlined. New combinations are made for the names of three species, *Maclurodendron porteri, M. obovatum,* and *M. oligophlebium,* all of which were previously described in the rutaceous genus *Acronychia,* and three species, *M. pubescens, M. parviflorum,* and *M. magnificum,* are described as new.

Introduction

Among the previously described species excluded from *Acronychia* J. R. & G. Forst. in my revision of that genus (1974) are *A. porteri* Hook. f., described from W. Malaysia, *A. obovata* Merr., from the Philippines, and *A. oligophlebia* Merr., from Hainan Island. These three species plus three others that are undescribed, one from W. Malaysia and two from E. Malaysia, comprise a morphologically isolated group of plants that has not been previously recognised. The purpose of this paper is to give a taxonomic account of this group, which is here described as a new genus.

Geographically, these plants range from Sumatra and the Malay Peninsula east to the Philippines and north to Vietnam and Hainan Island (Fig. 1). To *Acronychia,* which ranges from India to southwestern China and throughout Malesia to eastern Australia and New Caledonia, they are similar in a number of characters, including their opposite leaves, 4-merous flowers, biovulate carpels, and syncarpous, drupaceous fruits. *Sarcomelicope* Engl. (including *Bauerella* Borzi; see Hartley, in press), which ranges from eastern Aus-

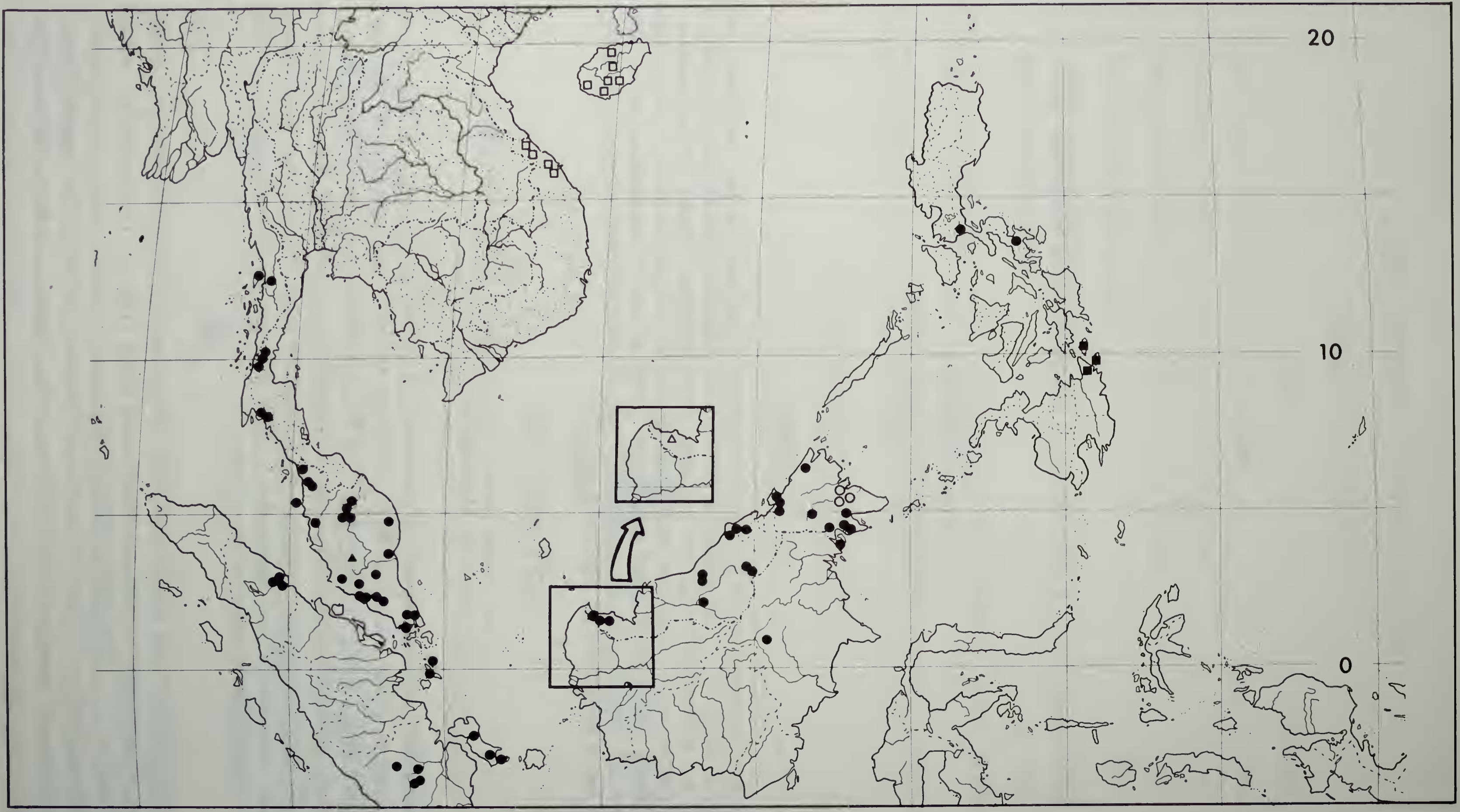

Fig. 1. Distributions of *Maclurodendron* species: *M. porteri* (dots), *M. pubescens* (circles), *M. obovatum* (solid squares), *M. oligophlebium* (open squares), *M. parviflorum* (open triangle), and *M. magnificum* (solid triangle).

Table 1.
Distinguishing characters of the genera *Acronychia*, *Sarcomelicope*, and *Maclurodendron*.

	Acronychia	*Sarcomelicope*	*Maclurodendron*
Leaves	opposite, trifoliolate or unifoliolate	opposite or verticillate, unifoliolate	opposite, unifoliolate
Flowers	bisexual	unisexual	unisexual
Petals	valvate, deciduous or rarely semi-persistent in fruit	imbricate, persistent or rarely semi-persistent in fruit	imbricate, deciduous in fruit
Staminal Filaments	ciliate toward the base or rarely eciliate, gradually tapering from a rather broad base to a subulate apex, becoming reflexed, deciduous in fruit	ciliate or ciliolate, elliptic-oblong, becoming straight, persistent or rarely semi-persistent in fruit	glabrous, sublinear, curved inward, minutely geniculate at the apex, deciduous in fruit
Fruits	axially syncarpous (the carpels otherwise separated by septicidal fisures) to completely syncarpous (the carpels connate throughout their length)	subapocarpous (the carpels basally connate but otherwise distinct and divergent) to completely syncarpous	completely syncarpous

tralia to New Caledonia and Fiji, is apparently the closest genus morphologically. It is similar in having unifoliolate leaves, unisexual, 4-merous flowers, imbricate petals, biovulate carpels, and drupaceous fruits, among other characters. The major differences between *Acronychia*, *Sarcomelicope*, and the group under study here are given in Table 1.

Although *Sarcomelicope* and *Maclurodendron* are morphologically close, their geographic ranges are so dissimilar that I doubt if they are directly related. They may, however, have evolved independently from a common ancestral group. Both have seeds with spongy tissue in the outer testa and this, as I have given evidence for in a revision of *Sarcomelicope* (in press), suggests derivation from a dehiscent-fruited group resembling the Indo-Pacific genus *Melicope* J. R. & G. Forst.

This study is based on herbarium specimens. The contributing herbaria, with abbreviations from Holmgren and Keuken's *Index Herbariorum*, Part 1, ed. 6 [Reg. Veg. 92 (1974)], are as follows: Arnold Arboretum of Harvard University, Cambridge (A); Bernice P. Bishop Museum, Honolulu (BISH); British Museum (Natural History), London (BM); Herbarium Bogoriense, Bogor (BO); Queensland Herbarium, Brisbane (BRI); Forest Research Institute and Colleges, Dehra Dun (DD); C.S.I.R.O. Herbarium Australiense, Canberra (CANB); Gray Herbarium of Harvard University, Cambridge (GH); Royal Botanic Gardens, Kew (K); Rijksherbarium, Leiden (L); Department of Forests, Lae, Papua New Guinea (LAE); National Herbarium of Victoria, Melbourne (MEL); University Herbarium, University of Michigan, Ann Arbor (MICH); National Herbarium of New South Wales, Sydney (NSW); New York Botanical Garden, New York (NY); Muséum National d'Histoire Naturelle, Paris (P); Herbarium, Botanic Gardens, Singapore (SING); Botanical Museum & Herbarium, Utrecht (U); Herbarium of the University of California, Berkeley (UC); National Museum of Natural History (Department of Botany), Smithsonian Institution, Washington, D. C. (US); and Naturhistorisches Museum, Wien (W).

Maclurodendron Hartley, gen. nov.

Plantae ligneae ut videtur dioicae; indumento brunneola vel ferruginea, trichomatibus simplicibus vel simplicibus et fasciculatis; gemmis nudis, dense pubescentibus; foliis oppositis, unifoliolatis; petiolo adaxialiter vadose caniculata, apice tumida; lamina pinnatinervis, integera, pellucido-punctata; inflorescentis axillaribus, anguste paniculatis vel racemosis; floribus unisexualibus, in alabastro globosis vel subglobosis; sepalis 4, basi connatis, valvatis, ovato-triangularibus, in fructu persistentibus; petalis 4, distinctis, erectis, patentibus, vel reflexis, anguste imbricatis, ovatis vel ovato-lanceolatis, apice acutis et adaxialiter minute uncinatis, in fructu deciduis; staminibus 8, distinctis, in fructu deciduis, alternatim inaequalibus, petala fere aequantibus, filamento glabro, sublineari, incurvato, apice subulato et minute geniculato, anthera ovoidea vel ellipsoidea, apiculata, dorsifixa, in floribus ♀ sine polline; disco intrastaminali, applanato vel pulvinato, irregulariter 8-lobato; gynoecio syncarpo, 4-carpellato, 4-loculato, in floribus ♀ petala fere aequanti, in floribus ♂ rudimentario, ovario subgloboso, plerumque vadose 4-lobato, placentatione axiali, ovulis in quoque loculo 2, collateralibus vel subcollateralibus, stylo recto, stigmate capitata, 4-lobata; fructibus drupaceis, syncarpis, 4-loculatis, exocarpio subcoriaceo, glanduloso-pustulato, mesocarpio spongioso, in sicco tenui vel obsoleto, endocarpio pergamentaceo, glabro, brunneo vel luteo, nitido; seminibus in quoque loculo 2 vel (abortibus) 1, ovoideis vel reniformibus, atrobrunneis vel nigeris, nitidis, testa exterior spongiosa (*Maclurodendron parviflorum* excepta), testa interior ossea; endospermio copioso, carnoso; embryone recto vel leviter flexo, elliptico vel late oblongo, cotyledonibus complanatis, hypocotylo terminali; fructibus et seminibus *M. magnificum* incognitis. Species typica: *M. porteri* (Hook. f.) Hartley.

Woody plants; apparently dioecious; indumentum brownish to rust coloured, trichomes simple or simple and fasciculate; buds naked, densely pubescent. Leaves opposite, unifoliolate; petiole shallowly caniculate adaxially, swollen at the apex; blade pinnately veined, entire, with pellucid oil dots. Inflorescences axillary, narrowly paniculate or racemose. Flowers unisexual, globose or subglobose in bud; sepals 4, basally connate, valvate, ovate-triangular, persistent in fruit; petals 4, distinct, erect, spreading, or reflexed, narrowly imbricate, ovate to ovate-lanceolate, acute and minutely hooked adaxially at the apex, deciduous in fruit; stamens 8, distinct, deciduous in fruit, the antesepalous nearly as long as the petals, the antepetalous slightly shorter, filament glabrous, sublinear, curved inward, subulate and minutely geniculate at the apex, anther ovoid to ellipsoid, apiculate, dorsifixed, without pollen in carpellate flowers; disc intrastaminal, flattened to pulvinate, irregularly 8-lobed; gynoecium a single 4-carpellate, 4-loculate pistil, nearly as long as the petals in carpellate flowers, rudimentary in staminate flowers, ovary subglobose and usually shallowly 4-lobed, placentation axile, ovules 2 per carpel, collateral to subcollateral, style straight, stigma capitate, 4-lobed. Fruits drupaceous, syncarpous, 4-loculate, exocarp subleathery, pustular-glandular, mesocarp spongy, thin to obsolete when dry, endocarp pergamentaceous, glabrous, brown to yellow, shiny. Seeds 2 or (by abortion) 1 per locule, ovoid to reniform, dark brown to black, shiny, outer testa spongy (except in *Maclurodendron parviflorum*), inner testa bony; endosperm copious, fleshy; embryo straight or slightly bent, elliptic to broadly oblong, cotyledons flattened, hypocotyl terminal. Fruits and seeds of *M. magnificum* unknown.

The name *Maclurodendron* commemorates Floyd A. McClure (1897–1970), well known for his extensive studies of the bamboos, and for his plant explorations in Southeast Asia. One of his collections from Hainan Island is the type of *M. oligophlebium.*

All of the species of *Maclurodendron* appear to be dioecious; I have not found any single specimens bearing flowers of both sexes or both fruits and staminate flowers.

The inflorescences are borne singly in the axils of leaves. They may be associated with most, or all, of the leaves of a flowering branchlet, or they may be restricted to the upper leaves. Taxonomically, this variability seems to be of no significance.

The inflorescences are usually pedunculate, but occasionally a single branch is developed at the base. Above the peduncle, the inflorescence is generally narrowly paniculate, with one or two lower pairs of branches above which the flowers are borne on pedicels attached directly to the main axis. The branches may be absent, however, and in such instances the inflorescences are racemose. This reduction in complexity of the inflorescence is irregular in occurrence and apparently has no taxonomic significance.

The rudimentary pistil of staminate flowers is generally minute, and its ovules, style, and stigma are not fully differentiated.

The pericarp is quite thin in all of the species and is sometimes split loculicidally in herbarium specimens of *Maclurodendron oligophlebium.* The split is apical and often irregular, and only occurs in one, or sometimes two, of the locules. It seems most likely that it is caused by pressing and drying the specimen; none of the collectors has noted its occurrence in fresh material.

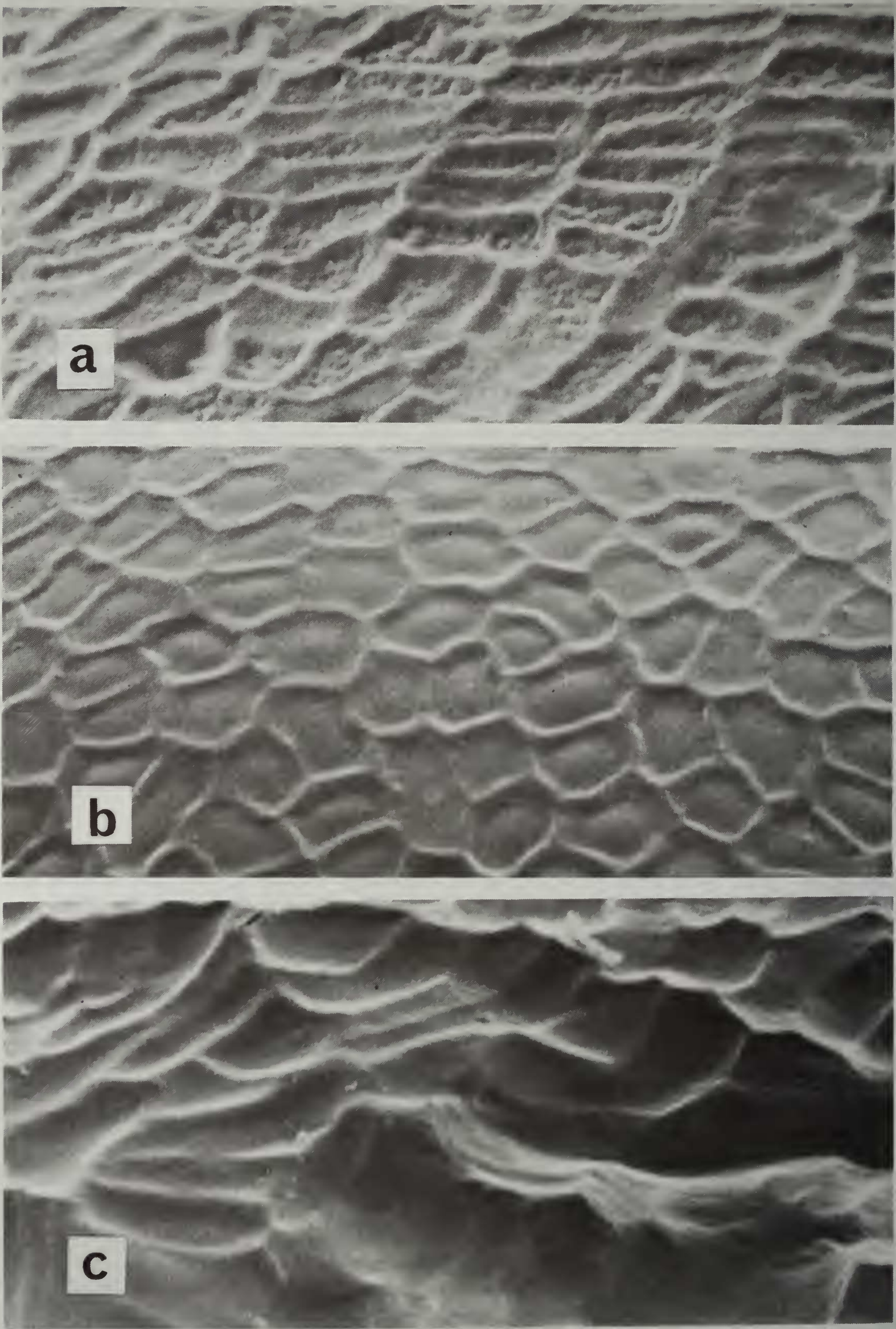

Plate 1. Scanning electron micrographs of seed coat sculpturing in *Maclurodendron* species: a, *M. porteri* (from *Ng FRI 1171*), showing irregularly reticulate surface; b, *M. obovatum* (from *Ramos & Convocar BS 83927*), showing regularly reticulate surface; c, *M. parviflorum* (from *Anderson S 25426*), showing irregularly roughened surface; all X 420.

The seeds vary considerably in shape depending on whether one or two develop in a locule. When only one is developed, it is regularly ovoid or reniform and usually rather turgid. When two are developed they are often irregularly shaped as a result of crowding: most commonly they are flattened on one side or on a portion of one side due to collateral or subcollateral crowding, but in some specimens of *Maclurodendron porteri* they are obliquely truncated as a result of being somewhat superposed in the locule.

Characteristics of the testa provide a basis for grouping the species (except for *Maclurodendron magnificum,* where the seeds are not known). This classification is given below.

Outline of species relationships

Outer testa consisting of a spongy layer bounded externally by a shiny pellicle, the surface reticulate*.

Surface of testa irregularly reticulate (see Pl. 1, a).
. . . . 1. *M. porteri*
. . . . 2. *M. pubescens*

Surface of testa regularly reticulate (see Pl. 1, b).
. . . . 3. *M. obovatum*
. . . . 4. *M. oligophlebium*

Outer testa consisting only of a shiny pellicle, the spongy layer obsolete, the surface irregularly roughened (see Pl. 1, c) . . . . 5. *M. parviflorum*

Seeds not known . . . . 6. *M. magnificum*

Key to the species

1\. Indumentum predominantly of spreading trichomes; mature leaf blades pubescent below, especially on the midrib and main veins . . . . 2. *M. pubescens*

1\. Indumentum predominantly of ascending (often appressed-ascending) trichomes; mature leaf blades glabrous or nearly so

  2\. Flower buds 2.5 – 3mm wide; sepals and petals densely pubescent abaxially . . . . . 6. *M. magnificum*

  2\. Flower buds 1 – 2mm wide; sepals and petals glabrous to rather densely pubescent abaxially

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* It is important to examine ripe seeds to determine sculpturing characteristics of the testa accurately.

3. Sepals at least half as long as the petals; petals about 1.5 mm long; seeds irregularly and longitudinally roughened (see Pl. 1, c) . . 5. *M. parviflorum*

3. Sepals less than half as long as the petals; petals 2 – 3 mm long; seeds minutely reticulate at 20X (see Pl. 1, a, b), at least over part of the surface

    4. Leaf blades subcoriaceous to coriaceous, the secondary veins and reticulations prominent, especially above; seeds regularly reticulate . . . . 3. *M. obovatum*

    4. Leaf blades chartaceous to subcoriaceous, the secondary veins and reticulations not very prominent; seeds regularly or irregularly reticulate

        5. Younger branchlets reddish; seeds collateral, regularly reticulate . . 4. *M. oligophlebium*

        5. Younger branchlets pale brown to dark brown; seeds subcollateral or subsuperposed, irregularly reticulate . . . . 1. *M. porteri*

1. *Maclurodendron porteri* (Hook. f.) Hartley, **comb. nov.** (Fig. 2).

Acronychia porteri Hook. f. Fl. Brit. India 1 (1875) 498. Lectotype (chosen here): *Maingay Kew Distribution No. 280,* W. Malaysia, Penang, Government Hill.

Melicope? helferi Hook. f. *ibid.* 492. Type: *Herb. Helfer 1192,* Burma, Tenasserim.

Jambolifera porteri (Hook. f.) O. Kuntze, Rev. Gen. Pl. 1 (1891) 102.

Melicope unifoliolata Merr. Philipp. J. Sci. Bot. 13 (1918) 74. Type: *Hose 556,* E. Malaysia, Sarawak, Miri River.

Small to medium tree to 25 m high; trichomes simple, or, in several Borneo collections, simple and fasciculate, predominantly ascending; innovations finely pubescent or puberulent; branchlets pale brown to dark brown, glabrous or nearly so, 2 – 6 mm wide. Leaves 6.5 – 29 cm long; petiole finely pubescent, especially adaxially, soon becoming glabrous, 0.7 – 3 (– 5) cm long; blade subcoriaceous or occasionally chartaceous, drying pale brown to dark brown to brownish green, glabrous or nearly so, obovate to oblanceolate or occasionally elliptic, 5.5 – 24 cm long, 1.8 – 10 cm wide, base cuneate or occasionally acute or attenuate, apex acuminate (the acumen 2 – 20 mm long) or occasionally acute, obtuse, rounded, or retuse, main veins 6 to 11 on each side of the midrib, secondary veins and reticulations not prominent. Inflorescences 2 – 15 cm long; peduncle, axis, branches, and pedicels minutely pubescent, soon becoming glabrous or nearly so;

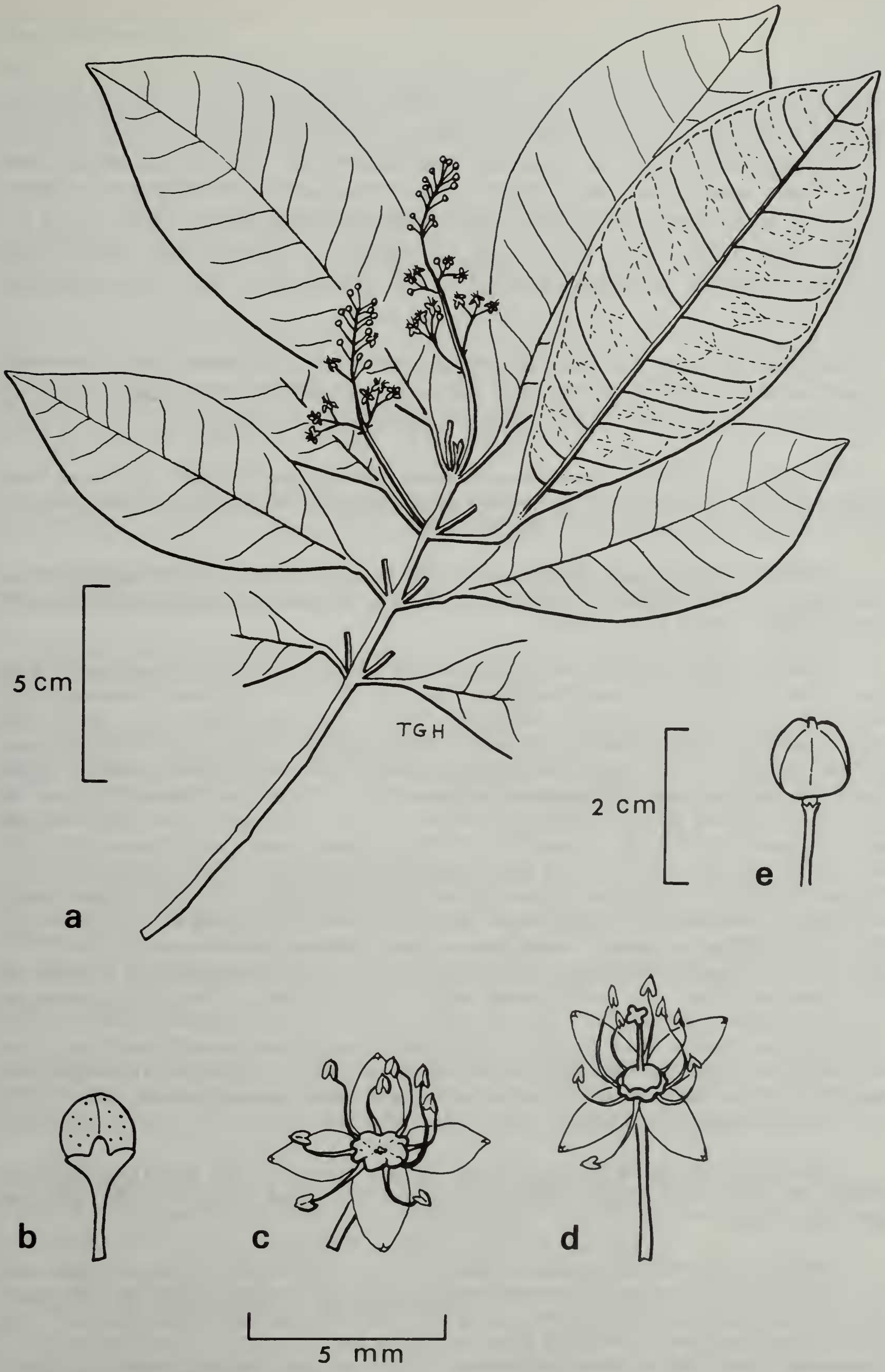

Fig. 2. *Maclurodendron porteri:* a, flowering branchlet; b, flower bud; c, staminate flower; d, carpellate flower; e, fruit (a-c drawn from *Ridley 3639a,* d from *Cockburn FRI 7835,* e from *Ng FRI 1171*).

pedicels 1 – 6 (– 7.5) mm long. Flowers green to yellow to white, in bud 1.5 – 2 mm wide; sepals glabrous or sparsely to rather densely pubescent, 0.5 – 1 mm long; petals glabrous or sparsely to rather densely pubescent abaxially, sparsely to densely pubescent or rarely glabrous adaxially, 2 – 2.5 mm long; anthers 0.6 – 0.8 mm long; disc glabrous, 1 – 1.5 mm wide; gynoecium glabrous, ovules subcollateral. Fruits glabrous, ovoid to subglobose or occasionally ellipsoid, often shallowly 4-lobed, often apiculate, (6 –) 8 – 11 mm wide. Seeds usually 2 per locule, subcollateral to subsuperposed, minutely and irregularly reticulate, often smooth over part of the surface, 4.5 – 8 mm long, outer testa spongy.

Distribution. Malay Peninsula and Sumatra east to the Philippines (Fig. 1); recorded mainly from well-drained, primary rain forests; occasionally from secondary forests and (a few Sarawak collections) heath forests; sea level to 900 (– 1500) m.

PENINSULAR BURMA. District Mergui: Pataw Island, *Parker 2768* (DD, K); Sarawa River, *Parker 2488* (DD, K). Without definite locality, *Herb. Helfer 1192* (K, holotype of *Melicope helferi* Hook. f.; GH, isotype), *Herb. Griffith 1189* (GH, L, W).

PENINSULAR THAILAND. Ranong, *Kerr 11767* (L), *16361* (BM, K), *17015* (BM, K, P); Ban Pang Wan, *Kerr 11953* (BM); Pang Nga, *Kerr 17171* (BM, P); Krabi, *Kerr 18603* (A, BM, K, L, P); without definite locality, *Kloss 7009* (K).

W. MALAYSIA. Kedah: Koh Mai Forest Reserve, *Kiah SF 35204* (K); Bukit Enggang Road, *Everett FRI 13746* (K, L); Jeniang Road, 48th mile, *Kiah SF 36165* (A). Penang: Government Hill, *Maingay Kew Distribution No. 280* (K, lectotype of *Acronychia porteri* Hook. f.; BM, GH, L, duplicates of lectotype), *Ridley*, March 1915 (BM); without definite locality, *Curtis 3089* (K), *Porter [Wallich Catalog No. 7756]* (BM, K). Kelantan: Kampong Gobik, Kerilla Estate, Tamangan, *Shah & Kadim 486* (A, K, L, LAE); Gunong Strong, *Whitmore FRI 12504* (K); Gua Musang, *Whitmore FRI 4020* (K, L); Gunong Rabong, *Soepadmo & Mahmud 1147* (L). Trengganu: Bukit Bauk Forest Reserve, *Whitmore FRI 3955* (K, L), *Wood KEP 76090* (L). Perak: Larut, *King's Collector 3979* (US), *4482* (K, US, W), *7469* (A, U); Gunong Bubu, *Everett FRI 13951* (K, L), *King's Collector 8338* (UC), *Suppiah FRI 11944* (L); Piah Forest Reserve, *Kochummen FRI 2422* (K, L); without definite locality, *Scortechini 11801* (BM, L). Pahang: Kuantan District, *Yeob CF 834* (K); Tasek Bera, *Soepadmo et al. KLU 11742* (BISH, L). Selangor: Genting Simpah Road, 17th mile, *Kochummen FRI 2054* (K, L); Weld Hill Forest Reserve, *Kochummen KEP 99520* (A, K, L); without definite locality, *Murdoch 154* (BM). Negri Sembilan: Galah Forest Reserve, *Ng FRI 1884* (L). Malacca: Tampin Hill, *Goodenough 1851* (NSW); Batang Malacca, *Derry 1043* (K, NSW); Ayer Panas Forest Reserve, *Ng FRI 1171* (L); without definite locality, *Derry 1162* (K), *Griffith* (BM, K, L). Johore: Segamat Forest Reserve, *Loh FRI 17130* (L); Sungai Peta near Kampong Tenang, Labis, *Heaslett*, 27 June 1971 (L); Sungai Kayu, *Kiah SF 32375* (A, LAE), *SF 32420* (LAE); Gunong Panti Forest Reserve, *Cockburn FRI 7742* (L), *FRI 7835* (L); Tanjong Sedili Kechil, *Cockburn FRI 7684* (K, L).

SINGAPORE. MacRitchie Reservoir, *Sinclair*, 26 Dec. 1948 (L), 16 Jan. 1949 (L); Bukit Timah, *Ridley*, Feb. 1900 (NSW); without definite locality, *Ridley 3467* (BM, K), *3639a* (NSW), *4741* BM, NSW), *5587* (BM).

SUMATRA. Asahan: Hoeta Padang, *Krukoff 4323* (A, L, NY, SING, US); Bandar Poelau, *Yates 2571* (MICH, NY, W); Loemban Ria vicinity, *Rahmat si Boeea 7975* (A, BISH, MICH, UC, US). Palembang: Tanjong Ring, *Forbes 2726* (BM, GH, K, L), *2832a* (BM, GH, K, L); Niroe River, *de Voogd 211* (L); Lematang River, *Anonymous Boschproefstation 103 T-3 P 272* (L), *Boschproefstation T [Thorenaar] 845* (L); Muara Enim, *Kostermans*, 2 Feb. 1956 (A, BISH, BM, CANB, L, LAE, NY, P). Lingga Archipelago: Lingga Island, Gunong Tanda, *Anonymous [Teysmann HB?] 14620* (L); Medang Island, *Anonymous HB 4004* (L, U). Bangka: Bangka Island, Gunong Mangol, *Kostermans & Anta 671* (A, L), *693* (A, K, L, LAE). *793* (A, L, LAE, NSW); Bangka Island, Lobok Besar, *Kostermans bb 34060* (A, L), *bb 34134* (A, L), *bb 34138* (L), *Kostermans & Anta 190* (L), *1067* (A, BO, L, SING); Lepar Island, *Bünnemeijer 2436* (L).

E. MALAYSIA. Sarawak. 1st Division: Gunong Pueh, *Ilias Paie S 13716* (K, L); Gunong Gading, *Ilias Paie S 13332* (L, SING); Semengoh Forest Reserve, *Bojeng bin Sitam S 14639* (A, L, MEL, SING), *Galau S 15644* (A, L), *Haji Bujang Tree No. 3926* (L), *Sibat ak Luang S 13960* (A, L, P); Kuching and vicinity, *Haviland 2257* (K, L), *2282* (K, L), *2846* (K). 3rd Division: Bukit Raya, *Smith & Chai S 27649* (L). 4th Division: Bukit Mayeng, *Purseglove 5370* (A, L, NY); Bukit Mersing, *Sibat ak Luang S 21938* (L, SING), *S 21984* (L); Miri River, *Hose 539* (K, L), *556* (K, L, isotypes of *Melicope unifoliolata* Merr.); Usun Apau Plateau, *Haji Suib S 23428* (A, L), *Murthy & Ashton S 22677* (A, K, L), *Pickles S 3914* (L, US), *S 3935* (L, US), *Sibat ak Luang S 22991* (A, L). Without definite locality, *Beccarri [PB] 3500* (K, P). Sabah. Beaufort District: Beaufort Hill, *Binideh [SAN] 55734* (L), *Mikil [SAN] 30331* (L), *Sadau [SAN] 42569* (K), *[SAN] 49548* (K, L); Lumat, *Buntar SAN 25805* (L). Tomani District: Kuala Tomani, *Binideh [SAN] 63165* (L). Ranau District: Kinabalu National Park, Bukit Kolong Ranau, *Gibot SAN 60674* (L). Beluran District: Sungai Sapi, K. B. Dev. Camp, *Tingguan SAN 36336* (K, L). Tawau District: Kalabakan, *Baker SAN 25017* (L); Quoin Hill Road, Mile 15, *Gibot SAN 31256* (SING), *[SAN] 34008* (K, L); Apas Road, Mile 15, *Jaswir Singh SAN 29961* (L). Lahad Datu District: Silam Quarry Hill, *Muin Chai SAN 25571* (L).

BRUNEI. Belait District, R. Belait at K. Ingei, *Ashton BRUN 199* (BO); Temburong District, Kuala Belalong, *Smythies, Wood & Ashton SAN 17077* (A, L).

KALIMANTAN. Kalimantan Tengah: Mt. Palimasan on Belajan River, *Kostermans 13013* (CANB, L); Nunukan Island, *Kostermans 9186* (A, L, SING), *9219* (A, BO, L), *Paijmans 105* (L), *158* (L).

PHILIPPINES. Luzon: Quezon Province, Tayabas, *Oro FB 31048* (NY); Camarines Sur Province, Mt. Madooy, *Edaño BS 76064* (A, K, MICH, NY).

Hooker based *Acronychia porteri* on three syntype collections, *Porter [Wallich Catalog No. 7756]* and *Maingay Kew Distribution No. 280*, both from Penang, and *Griffith s.n.*, from Malacca. The Kew sheet of the Maingay collection is chosen here as the lectotype.

The type collection of *Melicope? helferi* Hook. f., *Herb. Helfer 1192* (from Peninsular Burma), which consists of staminate flowering branchlets, is without doubt conspecific with the syntype collections of *Acronychia porteri* Hook. f. It is surprising that Hooker misplaced it in *Melicope* because the latter collections also include specimens with staminate flowers.

The type collection of *Melicope unifoliolata* Merr., *Hose 556*, from Sarawak, also consists only of staminate flowering branchlets, which probably explains its generic misplacement. Merrill noted that it was "manifestly allied" to *Melicope helferi* Hook. f.

As pointed out in the Outline of Species Relationships, *Maclurodendron porteri* appears to be most closely related to *M. pubescens*. The differences between the two species are mainly those of indumentum given in the Key to Species.

2. *Maclurodendron pubescens* Hartley, **sp. nov.**

Arbor parva vel mediocris usque 24 m alta; trichomatibus simplicibus et fasciculatis, pro parte maxima patentibus; innovationibus pubescentibus; ramulis cinereis vel pallido-brunneis vel atrobrunneis, pubescentibus, mox glabratis, 4 – 8 mm latis; foliis 13 – 28 cm longis; petiolo dense pubescenti, mox glabratis, 1.5 – 5 cm longo; lamina subcoriacea, in sicco pallido-viridulo-brunneis vel brunneis, subtus (praecipue in costa et venis) pubescenti, supra glabra, obovata vel oblanceolata vel (in foliis infrequentibus) elliptica, 11 – 23 cm longa, 4.8 – 10.5 cm lata, basi cuneata vel attenuata, apice acuminata (acumine 5 – 10 mm longo) vel rotundata vel retusa, venis primariis utrinsecus costae

8 – 11, venis secondariis et rete venularum non prominentibus; inflorescentiis 3 – 11 cm longis, pedunculo sparse vel dense pubescenti, postremo glabrato, rhachidi et ramis sparse vel dense pubescentibus, pedicellis dense pubescentibus, 3.5 – 5 mm longis; floribus viridibus, in alabastro 1.5 – 2 mm latis; sepalis pubescentibus, ca 0.8 mm longis; petalis abaxialiter pubescentibus, adaxialiter sparse pubescentibus vel fere glabris, 2 – 2.5 mm longis; antheris 0.5 – 0.7 mm longis; disco glabro, 1.5 – 1.8 mm lato; gynoecio rudimentario glabro, ovulis rudimentariis subcollateralibus; fructibus glabris, ovoideis vel subglobosis, 10 – 12 mm latis, vadose 4-lobatis, apice plerumque acutis; seminibus in quoque loculo plerumque 2, subcollateralibus, minute et irregulariter reticulatis, saepe partim laevibus, 5 – 7 mm longis, testa exterior spongiosa; floribus ♀ non visi. Holotypus: *Patrick P. Sam SAN 26359* (L).

Small to medium tree to 24 m high; trichomes simple and fasciculate, predominantly spreading; innovations pubescent; branchlets grey to pale brown to dark brown, pubescent, soon becoming glabrous, 4 – 8 mm wide. Leaves 13 – 28 cm long; petiole densely pubescent, soon becoming glabrous, 1.5 – 5 cm long; blade subcoriaceous, drying pale greenish brown to brown, pubescent below mainly on the midrib and veins, glabrous above, obovate to oblanceolate or (in occasional leaves) elliptic, 11 – 23 cm long, 4.8 – 10.5 cm wide, base cuneate to attenuate, apex acuminate (the acumen 5 – 10 mm long) to rounded or retuse, main veins 8 to 11 on each side of the midrib, secondary veins and reticulations not prominent. Inflorescences 3 – 11 cm long; peduncle sparsely to densely pubescent, finally becoming glabrous or nearly so; axis and branches sparsely to densely pubescent; pedicels densely pubescent, 3.5 – 5 mm long. Flowers green, in bud 1.5 – 2 mm wide; sepals pubescent, about 0.7 mm long; petals pubescent abaxially, sparsely pubescent to nearly glabrous adaxially, 2 – 2.5 mm long; anthers 0.5 – 0.7 mm long; disc glabrous, 1.5 – 1.8 mm wide; rudimentary gynoecium glabrous, rudimentary ovules subcollateral. Fruits glabrous, ovoid to subglobose, 10 – 12 mm wide, shallowly 4-lobed, usually acute at the apex. Seeds usually 2 per locule, subcollateral, minutely and irregularly reticulate, often smooth over part of the surface, 5 – 7 mm long, outer testa spongy. Carpellate flowers not seen.

Distribution. E. Malaysia, Sabah (Fig. 1); recorded from well-drained, primary forests; sea level to 130 m.

E. MALAYSIA. Sabah. Sandakan: Sepilok Forest Reserve, *Ampon & Patrick SAN 71519* (L), *Anonymous [G. H. S. Wood?] SAN A 3892* (A, L), *Meijer SAN 21746* (BO, L), *Meijer & Stone SAN 58909* (K, L), *Nicholson & Patrick P. Sam SAN 15404* (L), *SAN 17046* (L, SING), *Toipin SAN 40708* (K, L), *Wood SAN 16033* (A, BRI); Mt. Walker, *Madani SAN 44256* (K); Kobili Bukit, *Kadir [SAN] A 680* (CANB, US); Leila Forest Reserve, *Patrick P. Sam SAN 20650a* (L), *SAN 26359* (L, holotype; K, isotype), *SAN 26377* (L). Lamag District: Bilit, *Banang SAN 51928* (K, L).

As noted above, this species is probably most closely related to *Maclurodendron porteri.*

3. *Maclurodendron obovatum* (Merr.) Hartley, **comb. nov.**

Acronychia obovata Merr. Philipp. J. Sci. Bot. 12 (1917) 274. Type: *Mallonga FB 26473,* Philippines, Mindanao, Surigao Province, Manangas, Carrascal.

Small to medium tree to 13 m high; trichomes simple and fasciculate, predominantly ascending; innovations pubescent; branchlets pale brown to brownish red to blackish, pubescent, soon becoming glabrous, 5 – 6 mm wide. Leaves 9 – 21.5 cm long; petiole pubescent, especially adaxially, finally becoming glabrous or nearly so, 1.4 – 3 cm long; blade subcoriaceous to coriaceous, drying greenish brown to brown, usually pubescent below on the midrib, soon becoming glabrous, glabrous above, obovate or occasionally broadly oblanceolate, 7.5 – 18 cm long, 4.7 – 9 cm wide, base obtuse to cuneate, apex acuminate (the acumen 3 – 7 mm long), rounded, or subtruncate, main veins 9 to 14 on each side of the midrib, secondary veins and reticulations prominent, especially above. Inflorescences 3 – 10 cm long, peduncle, axis, branches, and pedicels sparsely pubescent, soon becoming glabrous or nearly so; pedicels 5 – 6 mm long. Flowers pale green, in bud 1.5 – 2 mm wide; sepals glabrate, about 0.7 mm long; petals glabrous abaxially, glabrous or nearly so adaxially, about 2.5 mm long; anthers 0.5 – 0.8 mm long; disc glabrous, 1.4 – 1.5 mm wide; gynoecium glabrous, ovules subcollateral. Fruits glabrous, globose or subglobose, often apiculate, 8 – 10 mm wide. Seeds 1 or 2 per locule, subcollateral or subsuperposed, minutely and regularly reticulate, often smooth over part of the surface, about 5 mm long, outer testa spongy.

Distribution. Philippines, northeastern Mindanao and nearby Bucas Grande and Dinagat Islands (Fig. 1); recorded from well-drained forests; low to middle altitudes.

PHILIPPINES. Mindanao. Surigao del Norte: Dinagat Island, *Ramos & Convocar BS 83811* (NY), *BS 83927* (NY), *Ramos & Pascasio BS 35184* (GH, NSW), *BS 35193* (A, BM, K, US); Bucas Grande Island, *Ramos & Pascasio BS 35058* (A, US). Surigao del Sur: Manangas, Carrascal, *Mallonga FB 26473* (US, isotype of *Acronychia obovata* Merr.); without definite locality, *Ramos & Pascasio BS 34681* (L).

As noted in the Outline of Species Relationships, this species appears to be most closely related to *Maclurodendron oligophlebium.* The main differences between the two species are in the texture of the leaf blade and the comparative prominence of the secondary veins and reticulations (see Key to Species) and in the arrangement of the ovules and seeds (subcollateral in *M. obovatum* vs. collateral in *M. oligophlebium*).

4. *Maclurodendron oligophlebium* (Merr.) Hartley, **comb. nov.**

Acronychia oligophlebia Merr. Philipp. J. Sci. 23 (1923) 246. Type: *McClure CCC 9496,* China, Hainan Island, Five Finger Mt.

Small to medium tree to 13 (– 25) m high; trichomes simple, predominantly ascending; innovations finely pubescent to puberulent; branchlets reddish, becoming grey-brown, glabrous or nearly so, 3 – 6 mm wide. Leaves 6.5 – 23.5 cm long; petiole finely pubescent to puberulent, especially adaxially, soon becoming glabrous, 0.8 – 2.5 cm long; blade chartaceous to subcoriaceous, drying brown or brownish green, glabrous or nearly so, obovate to oblanceolate or occasionally elliptic, 6 – 21.5 cm long, 2.5 – 8.2 cm wide, base cuneate to attenuate, apex acuminate (the acumen 5 – 10 mm long) or occasionally obtuse or rounded, main veins 6 to 10 on each side of the midrib, secondary veins and reticulations not very prominent. Inflorescences 3.5 – 10 cm long; peduncle, axis, and branches minutely pubescent, soon becoming glabrous or nearly so; pedicels minutely pubescent, 1.5 – 5 mm long. Flowers green, yellowish green, or white, in bud about 2 mm wide; sepals finely pubescent, 0.6 – 0.7 mm long; petals sparsely pubescent to glabrate abaxially, sparsely pubescent adaxially, 2.5 – 3 mm long; anthers 0.8 – 1 mm long; disc glabrous, 1.3 – 1.6 mm wide; gynoecium glabrous, ovules collateral. Fruits glabrous, globose or subglobose, often shallowly 4-lobed, often apiculate, 6 – 10 mm wide. Seeds usually 2 per locule, collateral, minutely and regularly reticulate, often smooth over part of the surface, 4.5 – 5.5 mm long, outer testa spongy.

Distribution. Hainan Island and Vietnam (Fig. 1); recorded from well-drained forests; 200 – 1200 m.

Illustration. C. C. Huang, *Acta Phytotax. Sinica* 7 (1958) *t. 66, fig. 1* (as *Acronychia oligophlebia*).

CHINA. Hainan Island: Ching Mai District, Pak Shik Ling vicinity, *Lei 543* (K, NY, UC, US, W), *851* (A, NY, UC, US, W); Dung Ka to We Fa Shi, *Chun & Tso 43753* (A, BISH, NY, W); Kan-en District, Chim Fung Ling, *Lau 3716* (A, BISH, P); Five Finger Mt., *Chun 1490* (UC), *McClure CCC 9496* (A, BISH, BM, K, P, UC, isotypes of *Acronychia oligophlebia* Merr.); Pao-ting, *How 72159* (A, P); Yaichow, *How 70313* (NY), *Liang 62369* (NY, US), *62465* (NY); Nagai District, Yeung Ling Shan, *Lau 51* (BM, MICH, NY, UC, US, W): Mo San Leng, *Chun & Tso 44291* (A, K, NY, US); without definite locality, *Liang 64191* (A, NY), *64246* (NY), *65061* (NY, US), *65179* (A, NY, UC), *Wang 34303* (A, NY).

VIETNAM, Quangtri Province: Massif de Dong Cho, *Poilane 11123* (P), *11195* (P), *11242* (P); Dent du Tigre, *Poilane 10287* (P), *10300* (P). Quangnam Province: Montagne de Ba Na, *Poilane 1498* (P); Col des Nuages pres de Tourane [Da Nang], *Poilane 7957* (P), *8025* (P), *8037* (P).

This species is apparently most closely related to *Maclurodendron obovatum* (see under that species).

5. *Maclurodendron parviflorum* Hartley, **sp. nov.**

Arbor parva usque ca 4.5 m alta; trichomatibus simplicibus, pro parte maxima ascendentibus; innovationibus puberulis; ramulis pallido-brunneis vel atro-brunneis, glabratis, ca 3 mm latis; foliis 10.5 – 19 cm longis; petiolo adaxialiter puberulo, mox glabrato, 1 – 2 cm longo; lamina subcoriacea, in sicco pallido-viridi, glabra vel fere glabra, elliptica vel (in foliis infrequentibus) obovata vel oblanceolata, 9 – 16.5 cm longa, 3 – 9 cm lata, basi cuneata, apice acuminata (acumine 5 – 10 mm longo) vel interdum obtusa vel retusa, venis primariis utrinsecus costae 7 – 11, venis secondariis et rete venularum non prominentibus; inflorescentiis 1 – 3 cm longis, pedunculo, rhachidi, et ramis puberulis, mox glabratis, pedicellis sparse puberulis, 1 – 3 mm longis; floribus pallido-viridibus vel pallido-luteis, in alabastro 1 – 1.5 mm latis; sepalis sparse puberulis, 0.7 – 1 mm longis; petalis glabris, ca 1.5 mm longis; antheris 0.4 – 0.5 mm longis; disco glabro, 0.6 – 1 mm lato; gynoecio glabro, ovulis subcollateralibus; fructibus glabris, ovoideis vel subglobosis, ca 7 mm latis, vadose 4-lobatis, apice acutis; seminibus in quoque loculo 1 vel 2, subcollateralibus, irregulariter et longitudinaliter rugosis, ca 5 mm longis, testa exterior non spongiosa. Typus: *J. A. R. Anderson S 25426* (L).

Small tree to about 4.5 m high; trichomes simple, predominantly ascending; innovations puberulent, branchlets pale brown to dark brown, glabrous or nearly so, about 3 mm wide. Leaves 10.5 – 19 cm long; petiole puberulent adaxially, soon becoming glabrous, 1 – 2 cm long; blade subcoriaceous, drying pale green, glabrous or nearly so, elliptic or (in occasional leaves) obovate or oblanceolate, 9 – 16.5 cm long, 3 – 9 cm wide, base cuneate, apex acuminate (the acumen 5 – 10 mm long) or occasionally obtuse or retuse, main veins 7 to 11 on each side of the midrib, secondary veins and reticulations not prominent. Inflorescences 1 – 3 cm long; peduncle, axis, and branches puberulent, soon becoming glabrous or nearly so; pedicels sparsely puberulent, 1 – 3 mm long. Flowers pale green or pale yellow, in bud 1 – 1.5 mm wide; sepals sparsely puberulent, 0.7 – 1 mm long; petals glabrous, about 1.5 mm long; anthers 0.4 – 0.5 mm long; disc glabrous, 0.6 – 1 mm wide; gynoecium glabrous, ovules subcollateral. Fruits glabrous, ovoid to subglobose, about 7 mm wide, shallowly 4-lobed, acute at the apex. Seeds 1 or 2 per locule, subcollateral, irregularly and longitudinally roughened, about 5 mm long, outer testa not spongy.

Distribution. E. Malaysia, Sarawak, vicinity of Kuching (Fig. 1); recorded from primary heath forest and secondary forest on podzolized soil; rather low elevation.

E. MALAYSIA. Sarawak. 1st Division: near Kuching, *Haviland 1986* (K); Stampin, 7 km south of Kuching, *Anderson S 25126* (L); vicinity of Kuching, Batu Kawa Road, 3½ Mile, *Anderson S 25426* (L, holotype).

As noted in the Outline of Species Relationships, of the five species for which seeds are known, this is the only one lacking spongy tissue in the outer testa. A spongy outer testa is apparently vestigial in indehiscent-fruited Rutaceae (see Hartley, in press) and therefore this may by, with regard to testa structure, the most highly derived species of the genus.

Besides the different structure of its testa, *Maclurodendron parviflorum* is distinguishable from the other species of the genus by its smaller flowers with sepals at least half as long (as opposed to less than half as long) as the petals.

6. *Maclurodendron magnificum* Hartley, sp. nov.

Acronychia sp. nov. (*"magnifica"* nom. prov.), B. C. Stone, Malaysian Forester 43 (1980) 252, *fig. 3*.

Arbor 4.5 m alta; trichomatibus simplicibus et fasciculatis, pro parte maxima ascendentibus; innovationibus subtiliter pubescentibus; ramulis cinereo-brunneis, subtiliter pubescentibus, mox glabratis, 6 – 7 mm latis; foliis 15 – 20 cm longis; petiolo praecipue adaxialiter pubescenti, postremo glabrato, 1.3 – 2 cm longo; lamina subcoriacea, in sicco viridi, subtus sparse pubescenti (praecipue in costa), mox glabrata, supra glabra, elliptica, 12.5 – 18.5 cm longa, 6.7 – 9.2 cm lata, basi acuta vel cuneata, apice acuminata (acumine 3 – 5 mm longo), venis primariis utrinsecus costae 11, venis secondariis et rete venularum non prominentibus; inflorescentiis ante anthesin ca 4.5 cm longis, pedunculo glabrato, rhachidi, ramis, et pedicellis dense pubescentibus, pedicellis 2 – 3 mm longis; floribus (alabastris ♂ solis visis) viridulis, in alabastro 2.5 – 3 mm latis; sepalis dense pubescentibus, ca 1.5 mm longis; petalis abaxialiter dense pubescentibus, adaxialiter sparse pubescentibus; antheris ca 1 mm longis; disco glabro, ca 1.2 mm lato; gynoecio rudimentario glabro, ovulis rudimentariis subcollateralibus; floribus ♀ et fructibus non visis. Holotypus: *Stone 8905* (L).

Tree 4.5 m high; trichomes simple and fasciculate, predominantly ascending; innovations finely pubescent; branchlets grey-brown, finely pubescent, soon becoming glabrous, 6 – 7 mm wide. Leaves 15 – 20 cm long; petiole pubescent, especially adaxially, finally becoming glabrous, 1.3 – 2 cm long; blade subcoriaceous, drying green, sparsely pubescent below mainly on the midrib, soon becoming glabrous, glabrous above, elliptic, 12.5 – 18.5 cm long, 6.7 – 9.2 cm wide, base acute to cuneate, apex acuminate (the acumen 3 – 5 mm long), main veins 11 on each side of the midrib, secondary veins and reticulations not prominent. Inflorescences prior to anthesis about 4.5 cm long; peduncle glabrate; axis, branches, and pedicels densely pubescent; pedicels 2 – 3 mm long. Flowers (only staminate buds seen) greenish, in bud 2.5 – 3 mm wide; sepals densely pubescent, about 1.5 mm long; petals densely pubescent abaxially, sparsely pubescent adaxially; anthers about 1 mm long; disc glabrous, about 1.2 mm wide; rudimentary gynoecium glabrous, rudimentary ovules subcollateral. Carpellate flowers and fruits not seen.

Distribution. Known only from the type locality (Fig. 1).

W. MALAYSIA. Pahang: summit area of Gunong Ulu Kali, *Stone 8905* (L, holotype).

According to Stone (1980 and in litt.), the following additional collections from Gunong Ulu Kali represent this species: eastern slope at 1500 m, *Stone 13904* (KLU); *Stone s. n.* 16 Sept. 1979 (KLU); *Stone 15088* (KLU).

Although the material I have seen (a single collection in late flower bud) is incomplete, I am confident that its identity is correct. It stands apart from the other species of the genus in having larger, more densely pubescent flower buds (as illustrated by Stone, 1980).

Benjamin Stone has recognised this plant as a novelty as far back as 1971, and on several subsequent trips to Gunong Ulu Kali has been unsuccessful in his search for fruiting specimens. He writes *(in litt.)* that in the past few years the vegetation of the summit area of Gunong Ulu Kali has been disturbed by commercial development, so the future of the species may be precarious.

Acknowledgements

I wish to thank the directors and curators of the herbaria listed on page 4 for making specimens in their care available to me. Thanks are also extended to Mike Moncur, C.S.I.R.O. Division of Land Use Research, who did the scanning electron microscopy.

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. (in press). A revision of the genus *Sarcomelicope* (Rutaceae). Austral. J. Bot.

Stone, B. C. (1980). Additions to the Malayan flora, VIII. Malaysian Forester 43: 244-262.

Index to collections

The numbers in parentheses refer to the corresponding species in the text.

Ampon & Patrick *SAN 71519* (2).

Anderson *S 25126, S 25426* (5).

Anonymous *Boschproefstation 103 T-3 P 272, Boschproefstation T [Thorenaar] 845* (1); *[G. H. S. Wood?] SAN A 3892* (2); *HB 4004, [Teysmann HB?] 14620* (1).

Ashton *BRUN 199* (1).

Baker *SAN 25017* (1).

Banang *SAN 51928* (2).

Beccari *[PB] 3500* (1).

Binideh, P., *[SAN] 63165* (1).

Binideh, R., *[SAN] 55734* (1).

Bojeng bin Sitam *S 14639* (1).

Bunnemeijer *2436* (1).

Buntar *SAN 25805* (1).

Chun, N. K., & Tso *43753, 44291* (4).

Chun, W. Y., *1490* (4).

Cockburn *FRI 7684, FRI 7742, FRI 7835* (1).

Curtis *3089* (1).

Derry *1043, 1162* (1).

Edãno *BS 76064* (1).

Everett *FRI 13746, FRI 13951* (1).

Forbes *2726, 2832a* (1).

Galau *S 15644* (1).

Gibot *SAN 31256, [SAN] 34008, SAN 60674* (1).

Goodenough *1851* (1).

Haji Bujang *Tree No. 3926* (1).

Haji Suib *S 23428* (1).

Haviland *1986* (5); *2257, 2282, 2846* (1).

Herb. Griffith *1189* (1).

Herb. Helfer *1192* (1).

Hose *539, 556* (1).

How *70313, 72159* (4).

Ilias [bin] Paie *S 13332, S 13716* (1).

Kadir *[SAN] A 680* (2).

Kerr *11767, 11953, 16361, 17015, 17171, 18603* (1).

Kiah *SF 32375, SF 32420, SF 35204, SF 36165* (1).

King's Collector *3979, 4482, 7469, 8338* (1).

Kloss, C. B., *7009* (1).

Kochummen *FRI 2054, FRI 2422, KEP 99520* (1).

Kostermans *9186, 9219, 13013, bb 34060, bb 34134, bb 34138* (1).

Kostermans & Anta *190, 671, 693, 793, 1067* (1).

Krukoff *4323* (1).

Lau *51, 3716* (4).

Lei *543, 851* (4).

Liang *62369, 62465, 64191, 64246, 65061, 65179* (4).

Loh *FRI 17130* (1).

Madani *SAN 44256* (2).

McClure *CCC 9496* (4).

Maingay *Kew Distribution No. 280* (1).

Mallonga *FB 26473* (3).

Meijer *SAN 21746* (2).

Meijer & Stone *SAN 58909* (2).

Mikil *[SAN] 30331* (1).

Muin [bin] Chai *SAN 25571* (1).

Murdoch *154* (1).

Murthy & Ashton *S 22677* (1).

Ng *FRI 1171, FRI 1884* (1).

Nicholson & Patrick P. Sam *SAN 15404, SAN 17046* (2).

Oro *FB 31048* (1).

Paijmans *105, 158* (1).

Parker *2488, 2768* (1).

Pickles *S 3914, S 3935* (1).

Poilane *1498, 7957, 8025, 8037, 10287, 10300, 11123, 11195, 11242* (4).

Porter *[Wallich Catalog No.] 7756* (1).

Purseglove *5370* (1).

Rahmat si Boeea *7975* (1).

Ramos & Convocar *BS 83811, BS 83927* (3).

Ramos & Pascasio *BS 34681, BS 35058, BS 35184, BS 35193* (3).

Ridley *3467, 3639a, 4741, 5587* (1).

Sadau *[SAN] 42569, [SAN] 49548* (1).

Sam, Patrick P., *SAN 20650a, SAN 26359, SAN 26377* (2).

Scortechini *11801* (1).

Shah & Kadim *486* (1).

Sibat ak Luang *S 13960, S 21938, S 21984, S 22991* (1).

Singh *SAN 29961* (1).

Smith & Chai *S 27649* (1).

Smythies, Wood, & Ashton *SAN 17077* (1).

Soepadmo et al. *KLU 11742* (1).

Soepadmo & Mahmud *1147* (1).

Stone *8905, 13908, 15088* (6).

Suppiah *FRI 11944* (1).

Tingguan *SAN 36336* (1).

Toipin *SAN 40708* (2).

de Voogd *211* (1).

Wang *34303* (4).

Whitmore *FRI 3955, FRI 4020, FRI 12504* (1).

Wood *SAN 16033* (2); *KEP 76090* (1).

Yates *2571* (1).

Yeob *CF 834* (1).

Addendum

Since this article went to press, the fruit of *Maclurodendron magnificum* has been collected for the first time: W. Malaysia: Pahang: summit area of Gunong Ulu Kali, *Stone 15088-bis* (CANB, spirit collection; KLU). Thanks are extended to Dr. Stone for sending the sample of this material to Canberra. Its description follows.

Fruits glabrous, subglobose, about 10 mm wide, apex rounded and with 4 separate (about 5 mm apart) scars of stylar elements. Seed 1 per locule (each paired with an aborted ovule), minutely and irregularly reticulate, about 5 mm long, outer testa spongy.

In all of the species of *Maclurodendron* the style consists of four coherent stylar elements and is deciduous early in the development of the fruit. Here the scars of the stylar elements become widely separated as the fruit matures, whereas in all of the other species they remain confluent at the apex of the fruit. If, as is suggested, *Maclurodendron* has evolved from a genus resembling *Melicope* (the fruits of which are usually nearly apocarpous and always have widely separate stylar element scars), the former character state probably represents the more primitive condition in the genus.

The following amended classification of the species of *Maclurodendron* takes into account this new differential fruit character and the characteristics of the testa of the previously-unknown seeds of *M. magnificum.*

Outline of species relationships

Scars of stylar elements widely separate in fruit; outer testa consisting of a spongy layer bounded externally by a shiny pellicle, the surface irregularly reticulate . . 1. *M. magnificum*

Scars of stylar elements confluent at the apex of the fruit

- Outer testa consisting of a spongy layer bounded externally by a shiny pellicle, the surface reticulate
  - Surface of testa irregularly reticulate . . . 2. *M. porteri*
  - . . . . 3. *M. pubescens*
  - Surface of testa regularly reticulate . . . . 4. *M. obovatum*
  - . . . . 5. *M. oligophlebium*
- Outer testa consisting only of a shiny pellicle, the spongy layer obsolete, the surface irregularly roughened . . . . 6. *M. parviflorum*